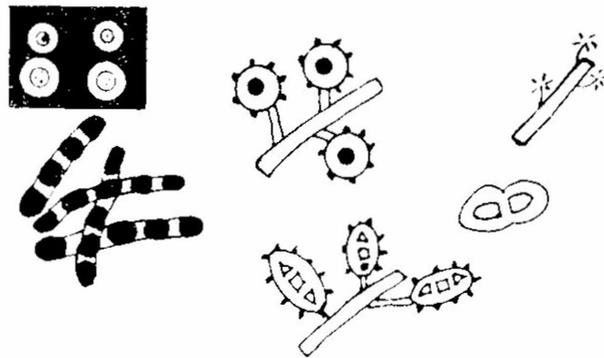


CENTER FOR DISEASE CONTROL

MYCOSES

SURVEILLANCE



PREFACE

The systemic fungal diseases are not included among the reportable diseases in many states. It is, therefore, difficult to assess the true size of the mycoses problem. This report summarizes presently available information with the hope that it may stimulate more active reporting of these diseases.

Information presented here is received from state and local health departments and other pertinent sources and is intended primarily for use by those responsible for disease control activities. Much of the information is preliminary. Anyone desiring to quote this report should contact the original investigator for confirmation and interpretation.

Contributions to this report are welcomed. They should be addressed to:

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
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Center for Disease Control

TABLE OF CONTENTS

I. SURVEILLANCE	1
A. Reported Cases and Deaths	1
B. Fungal Serology	1
II. COOPERATIVE MYCOSES STUDY	1
A. Statistical Summary	1
B. Summary of Report	1
III. SPECIAL REPORTS	1
A. Hospital Survey of the Mycoses	1
B. Amphotericin B Dose Studies in Histoplasmosis	2
C. Mechanical Building Ventilation and Aspergillosis	2
D. Large Outbreak of Coccidioidomycosis	3
E. FA Diagnoses of Mycoses Available	3

I. SURVEILLANCE

A. Reported Cases and Deaths

Thirteen-hundred-eight cases of six systemic mycoses were reported optionally to the Public Health Service by 29 states in 1970 (Table 1).

Histoplasmosis was reported by the greatest number of states, 18, and most of the 215 cases reported were concentrated in the Mississippi-Ohio River valleys.

Coccidioidomycosis accounted for the greatest number of cases, and California and Arizona reported 998 of the 1017 cases (98%) in 12 states.

Following coccidioidomycosis and histoplasmosis in frequency were blastomycosis (41 cases in 11 states), cryptococcosis (23 cases in 9 states), actinomycosis (7 cases in 6 states), and nocardiosis (4 cases in 3 states).

Cryptococcosis was the most common mycotic cause of death in 1968 (Table 2), the latest year for which figures are available. National death certificate information attributes 96 deaths to cryptococcosis, 58 each to coccidioidomycosis and histoplasmosis, and 16 to actinomycosis. None was reported for blastomycosis.

B. Fungal Serology

State public health laboratories reported a total of 131,906 fungal serology tests on 43,665 specimens during fiscal year 1970. Positive results, usually considered to be evidence of an active or recent infection, were reported for 11,914 tests. Of the 27 states reporting fungal serologies, 27 performed exams for histoplasmosis, 26 for coccidioidomycosis, and 25 for blastomycosis.

II. COOPERATIVE MYCOSES STUDY

A. Statistical Summary

The CDC Cooperative Mycoses Study entered 96 new cases during 1970 (Table 4). A total of 1323 cases of 9 mycoses from 25 states has been entered since the beginning of the study in 1958 (Table 5). The study is a joint venture by physicians and hospitals in several states and the Ecological Investigations Program, CDC, to evaluate chemotherapy of the systemic mycoses.

B. Summary of Report

The following is a summary of a recent paper from the study. "Disseminated Histoplasmosis: Results of Long-Term Follow-up." A CDC Cooperative Mycoses Study report prepared by George A. Sarosi, MD, Douglas W. Voth, MD, Bernhoff A. Dahl, MD, Irene L. Doto, MA, and Fred E. Tosh, MD. *Annals of Internal Medicine*, 75(4):511-516, October 1971.

Fifty-four cases of disseminated histoplasmosis were studied over 12 years in 8 hospitals in a cooperative study. Twenty-four patients received intravenous amphotericin B. All but 3 survived at least 8 months, and 9 were still alive an average of 62 months after treatment. Of 30 untreated patients, 8 were diagnosed at necropsy. Only 2 untreated patients remain alive, and 16 died within 4 months of diagnosis. Improvement correlated well with early amphotericin therapy and a total dose of 38 mg/kg of body weight. Adrenal insufficiency developed in half the patients regardless of treatment and was the most common cause of death. Only two patients with this complication remain alive. All patients with disseminated histoplasmosis should be evaluated carefully and repeatedly for adrenal gland insufficiency.

III. SPECIAL REPORTS

A. Hospital Survey of the Mycoses

Mycoses are reported on an optional basis to the Center for Disease Control, but reporting procedures vary considerably. In fact, the number of deaths due to cryptococcosis and blastomycosis frequently surpasses the number of reported cases. Local interest has promoted reliable surveillance in some localities for certain diseases, but it is not possible to piece together a national picture of the mycoses from this information.

In January 1971, to investigate an alternate approach, the Mycoses Epidemiology Unit, EIP, wrote to the medical record room librarians of all hospitals with more than 300 beds and a major affiliation with a medical school (MAMS). Each of the 162 hospitals was asked to provide the age, sex, year of discharge, discharge status (living or dead), and duration of hospital stay of all patients discharged from that hospital in 1968 and 1969 with a diagnosis of aspergillosis, blastomycosis,

coccidioidomycosis, or histoplasmosis. We asked that only those patients for whom the diagnosis was the major reason for admission be included and that patients with multiple admissions for the same diagnosis be listed only once. However, coding systems varied among the hospitals and few were able to comply with these last two requests. Similar data requested from the Central Office of the U.S. Veterans Administration Hospitals provided the information on patients for whom the disease was the primary reason for hospitalization, but included the patient each time he was admitted.

One hundred-five (65%) of the 162 hospitals responded. Table 6 shows the number of cases reported in response to the mail survey and, for comparison, the number of cases optionally reported to the CDC for the same years. With the exception of coccidioidomycosis, many more cases were reported in the MAMS hospital survey. Coccidioidomycosis is a reportable disease in California and Arizona, and the bulk of cases reported to CDC came from these two states. Subtracting the California and Arizona cases from the totals of our survey and those reported to CDC, the MAMS hospitals reported 89 cases in 1968 and 1969 while only 25 were optionally reported to CDC.

Omitting the VA data because of obvious bias, males predominated in all five mycotic infections. Aspergillosis and histoplasmosis patients were 58% male, cryptococcosis was 67% male, coccidioidomycosis was 71% male, and blastomycosis was 77% male.

Figures 1A - 1E show the age-sex distribution for cases reported in the hospital survey. For all diseases except coccidioidomycosis, most cases occurred in persons in the fifth through seventh decade. Persons in the second through seventh decades contributed approximately equal numbers of cases of coccidioidomycosis.

Regional contributions conformed to predicted patterns. Histoplasmosis was most prevalent in West North Central and East South Central Census Areas, blastomycosis in the East South Central Area, and coccidioidomycosis in the Pacific Area. Aspergillosis and cryptococcosis showed no regional concentrations. Except for there being no cases of blastomycosis reported from the Mountain Area, cases of all diseases were reported from all regions.

Although the survey yielded no unexpected results, a few points deserve emphasis. The number of cases reported in this special survey are, except for coccidioidomycosis, many more than are reported voluntarily. Certainly these numbers also underestimate the real prevalence of deep mycotic infections. In addition, despite predictable regional concentrations of mycotic infections, cases occurred in all parts of the country.

B. Amphotericin B Dose Studies in Histoplasmosis

Dr. Wheelan D. Sutliff, reporting for the Veterans Administration - Armed Forces Fungus Disease Cooperative Study and Veterans Hospital, Memphis, recently published the results of clinical trials of amphotericin B in 85 patients with chronic pulmonary histoplasmosis. The patients were divided into two groups, one receiving a 0.5g dose over a 3.5-week period and the other a 3.5g dose over 17 weeks. The 0.5g dose controlled the infection in 64 percent of the group and produced toxic effects in 80 percent; re-treatment of patients who failed to respond was successful. The 2.5g dose controlled the infection, but it produced toxicity in 86 percent of the patients. Toxicity in 29 percent was so severe as to warrant discontinuation of therapy. Death in both groups was usually related to concomitant debilitating disease.

The efficacy in eliminating *Histoplasma* from the sputum and the occurrence of toxicity were related to both dose and duration of therapy with amphotericin B. Dr. Sutliff suggests the use of a dose between 0.5 and 2.5g or the use of the small dose followed by re-treatment when necessary.

Source: Sutliff WD: Histoplasmosis cooperative study, V. Amphotericin B dosage for chronic pulmonary histoplasmosis. *Am Rev Resp Dis* 105:60-67, 1972.

C. Mechanical Building Ventilation and Aspergillosis

Dr. Harold D. Rose recently reported a sharp decline in the number of patients with pulmonary aspergillosis at the Veterans Administration Center in Wood, Wisconsin, when the Center moved from its old facilities to a new building with a mechanical ventilation system. Comparing the record of the last five years in the old facilities to the first five years in the new, 15 patients with pulmonary aspergillosis were seen in the old facilities and 8 in the new. In the old building, 11 patients developed terminal *Aspergillus* pneumonia while in the hospital; no such cases were recorded in the new building. Both hospitals were sampled once using the settle plate method. *A. fumigatus* spores were present in the old hospital but were not detected in the new one.

The VA's new hospital at Wood is entirely mechanically ventilated. All outside air enters at the first, second, sixth, or tenth floors. It is prefiltered by a roll-type filter and then goes through either a bag or

electrostatic filter before being distributed to the wards. Each room has a separate inlet and outlet, and the extracted air is exhausted at roof level.

Source: Rose HD: Mechanical control of hospital ventilation and *Aspergillus* infections. *Am Rev Resp D* 105:306-307, 1972.

D. Large Outbreak of Coccidioidomycosis

Dr. S. Benson Werner and associates have reported possibly the largest outbreak of coccidioidomycosis in the literature to date. At least 61 of 103 archeology students and instructors were involved in the epidemic, which was traced to a point source located outside previously recognized bounds of endemicity. About 80 percent of the exposed group were from New York, and most had not previously been in coccidioidomycosis-endemic areas. The outbreak was characterized by its magnitude, the high proportion of symptomatic infection among proved cases, and the frequency of rash.

Source: Werner SB, Pappagianis D, Heindl I, and Mickel A: An epidemic of coccidioidomycosis among archeology students in northern California. *NEJM* 286:507-512, 1972.

E. FA Diagnosis of Mycoses Available

Dr. William Kaplan, Chief of the Developmental Mycology Unit, Laboratory Division, Center for Disease Control, recently reported that the fluorescent antibody (FA) technique is now among the procedures used at CDC to diagnose eight fungal diseases: actinomycosis, blastomycosis, candidiasis, coccidioidomycosis, cryptococcosis, histoplasmosis, paracoccidioidomycosis, and sporotrichosis. It is possible to demonstrate and identify pathogenic fungi in all types of clinical material, including sections of formalin-fixed, paraffin-embedded tissues. The FA technique can also be modified to detect and measure fungus antibodies in serum and other body fluids. Dr. Kaplan describes the technique as "fast, versatile, and simple," but adds that the test should be performed by specially trained personnel.

Specimens may be sent to CDC for diagnosis; they should be sent through state health departments to the Center for Disease Control, Attention: Dr. William Kaplan, Developmental Mycology Unit, Atlanta, Georgia 30333.

Source: CDC Veterinary Public Health Notes, May 1971.

TABLE 1
MYCOTIC DISEASES OPTIONALLY REPORTED TO
THE U.S. PUBLIC HEALTH SERVICE, 1970

STATE	ACTINO.	BLASTO.	COCCI.	CRYPTO.	HISTO.	OTHER	TOTAL
Alabama			1		24		25
Arizona			542		3		545
Arkansas		12	1		24		37
California			456				456
Florida	1	3		1	1		6
Illinois	2	4	2		49	1	58
Indiana					5		5
Iowa	1	1		2	22		26
Kansas				1	1		2
Kentucky					2		2
Louisiana		2	2	3	6		13
Massachusetts	1						1
Michigan	1						1
Minnesota					16	3*	19
Mississippi	1	2			6		9
Missouri		1	4	6	29	1*	41
New Jersey		12			14		26
New Mexico			2				2
New York				1			1
Ohio		1					1
Oklahoma		1	1		3		5
Oregon			2				2
Pennsylvania				3			3
Rhode Island				1			1
South Carolina		2		5	5		12
Utah			3				3
Virginia					1		1
Washington			1				1
Wisconsin					4		4
TOTAL	7	41	1,017	23	215	5	1,308
NO. STATES REPORTING	6	11	12	9	18	3	29

* - Nocardiosis

TABLE 2
REPORTED DEATHS IN THE UNITED STATES
FROM FIVE SYSTEMIC FUNGAL DISEASES, 1964 to 1968

DISEASE	1968	1967	1966	1965	1964
Actinomycosis	16	28	21	26	31
Blastomycosis	—	17	12	29	21
Coccidioidomycosis	58	49	45	52	46
Cryptococcosis	96	65	90	62	74
Histoplasmosis	58	67	60	74	77
Totals	228	226	228	243	249

TABLE 3
FUNGAL SEROLOGY TESTING BY STATE PUBLIC HEALTH LABORATORIES
Fiscal Year 197

STATE	TOTAL SPEC.	TOTAL EXAMS.	TOTAL POS.	BLASTOMYCOSIS		COCCIDIOIDOMYCOSIS		HISTOPLASMOSIS		OTHER	
				EXAMS.	POS.	EXAMS.	POS.	EXAMS.	POS.	EXAMS.	POS.
Alabama	1,519	7,402	287	1,519	95	1,519	4	3,038	160	1,326	28
Arizona	10,387	13,388	2,083	—	—	12,353	1,904	976	168	59	11
Arkansas	1,552	6,208	678	1,552	270	1,552	2	3,104	406	—	—
Georgia	629	2,516	48	629	23	629	2	1,258	23	—	—
Illinois	4,411	13,951	1,384	2,526	216	2,526	16	8,822	1,132	77	20
Indiana	1,219	3,724	354	1,219	65	67	1	2,438	288	—	—
Iowa	621	2,616	305	654	64	654	6	1,308	235	—	—
Kansas	373	1,492	44	373	29	373	—	746	15	—	—
Kentucky	1,744	7,281	701	1,816	172	1,604	10	3,861	519	—	—
Louisiana	*	2,773	305	698	119	698	25	1,377	161	—	—
Maryland	2,487	4,939	*	1,172	*	1,172	*	2,595	*	—	—
Michigan	1,618	6,472	*	1,618	*	1,618	*	3,236	*	—	—
Minnesota	936	4,232	830	978	161	972	18	2,282	651	—	—
Mississippi	1,639	4,999	499	1,639	140	82	1	3,278	358	—	—
Missouri	1,517	6,238	469	1,544	96	1,541	7	3,153	366	—	—
Montana	*	66	—	16	—	20	—	28	—	2a	—
New York	*	2,992	*	1,121	*	304	*	1,121	*	446	*
North Carolina	*	1,950	130	560	47	270	2	1,128	81	—	—
Ohio	3,462	8,974	2,014	1,036	315	1,037	166	6,901	1,533	—	—
Oregon	106	424	6	106	—	106	—	212	6	—	—
South Carolina	767	2,057	202	214	11	214	1	1,629	190	—	—
Tennessee	2,996	5,992	539	—	—	—	—	5,992	539	—	—
Texas	3,281	13,119	648	3,280	226	3,279	39	3,281	282	3,279	101
Vermont	64	256	9	64	1	64	—	128	8	—	—
Virginia	1,391	5,564	237	1,391	68	1,391	4	2,782	165	—	—
West Virginia	107	260	31	81	6	82	—	97	25	—	—
Wisconsin	839	2,021	111	591	9	591	4	839	98	—	—
TOTAL	43,665	131,906	11,914	26,397	2,133	34,718	2,212	65,202	7,409	5,189	160

* No information reported

— No activity on report

a Cryptococcosis

States reporting no fungal serology activity were:

Colo., Conn., Del., Fla., Hawaii, Idaho, Me., Mass., Nev., N.H., N.J., N.D., Pa., R.I., Utah, Wash., and Wyo.

States not reporting were:

Calif., Nebr., Okla., and S.D.

Referred to CDC:

Alaska, D.C., Mont., and N.M.

From Consolidated Annual Report on State and Territorial Public Health Laboratories, Fiscal Year 1970.

TABLE 4
NUMBER OF CASES BY STATE ENTERED IN THE CDC COOPERATIVE
MYCOSES STUDY, January 1, 1970 thru December 31, 1970

STATE	BLASTO.	COCCI.	CRYPTO.	HISTO.	SPORO.	ASPER.	TOTALS
Arkansas	2			4		5	11
Illinois				4			4
Indiana				2		3	5
Kansas			2		7	2	12*
Kentucky				2		3	5
Missouri	2	4	6	19	1	11	44*
Tennessee	1		3	4		3	11
Texas		5	3	2	1	3	
Virginia	1			2		1	4
TOTALS	6	9	14	39	9	31	96

*Includes: *Alleschria boydii* – Kansas 1; and *Nocardia asteroides* – Missouri 1.

TABLE 5
NUMBER OF CASES BY STATE IN THE CDC COOPERATIVE MYCOSES
STUDY, January 1, 1958 thru December 31, 1970

STATE	BLASTO.	COCCI.	CRYPTO.	HISTO.	SPORO.	ASPER.	TOTALS	NO. OF DISEASES REPORTED
Arizona		2					2	1
Arkansas	18	4	2	102	1	10	137	6
California			1	2			3	2
Delaware			3	4		1	8	3
Georgia				2			2	1
Illinois	7		3	32			42	3
Indiana	3	2	4	43		9	61	5
Iowa	2	1	1	5			9	4
Kansas	6	5	13	45	21	11	103*	8*
Kentucky	21		2	147		12	182	4
Louisiana				5			5	1
Missouri	19	9	18	299	7	28	382*	7*
Nebraska		1		1			2	2
New York			1				1	1
North Carolina	2		1				3	2
Ohio	3			49	1		53	3
Oklahoma		1	2	1			4	3
Pennsylvania	1		1				2	2
South Dakota	1						1	1
Tennessee	16		15	68		6	105	4
Texas	3	90	14	68	2	3	181*	6*
Vermont				2	6		8	2
Virginia	4		1	15		4	25*	5*
West Virginia				1			1	1
Wisconsin	1						1	1
TOTAL	107	115	81	892	38	84	1,323*	9*
NO. OF STATES	15	9	15	20	6	9	25	

*Includes: *Allescheria boydii* – Kansas 1, Texas 1; *Nocardia asteroides* – Missouri 2, Virginia 1; and *Nocardia brasiliensis* – Kansas 1.

TABLE 6
 SELECTED MYCOTIC INFECTIONS FROM SPECIAL SURVEYS
 AND OPTIONALLY REPORTED TO THE CENTER FOR DISEASE CONTROL
 1968 and 1969

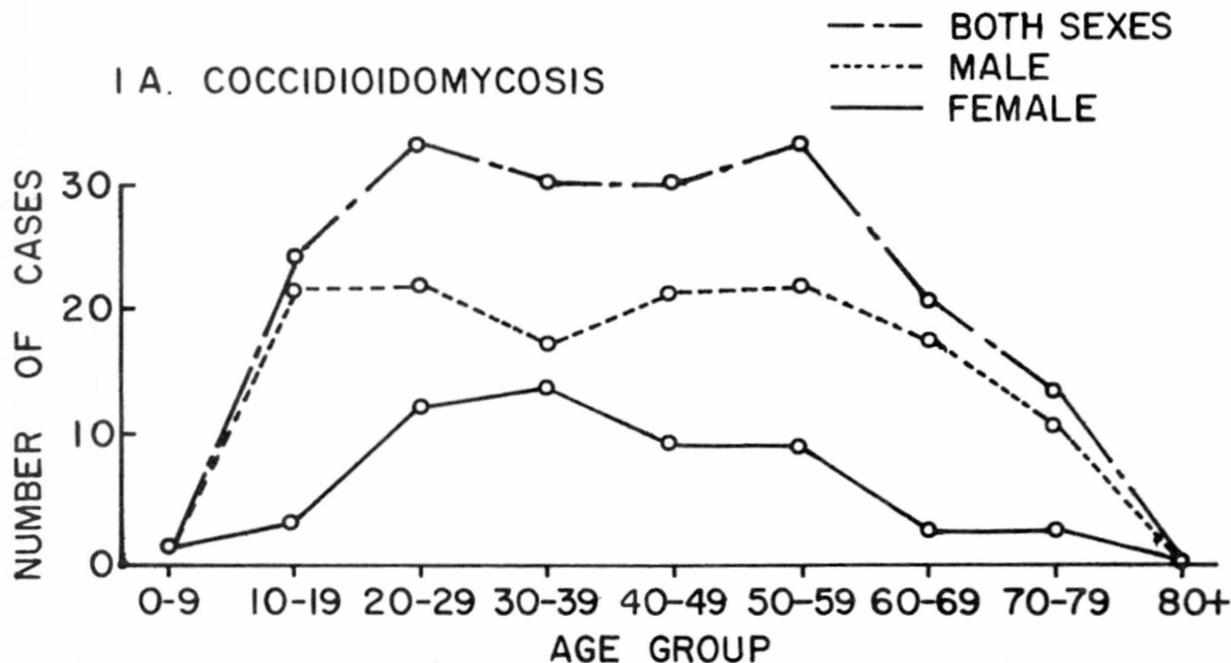
Disease	MAMS* Hospitals		V A** Hospitals		VA and MAMS Combined		Optionally Reported to CDC	
	Year		Year		Year		Year	
	1968	1969	1968	1969	1968	1969	1968	1969
Coccidioidomycosis	67	87	199	143	266	230	990	903
Cryptococcosis	71	83	24	31	95	114	16	20
Blastomycosis	76	31	60	54	136	85	14	30
Aspergillosis	131	84	—	—	131	84	0	0
Histoplasmosis	360	344	219	216	579	560	158	207

*MAMS — Major Affiliation with a Medical School

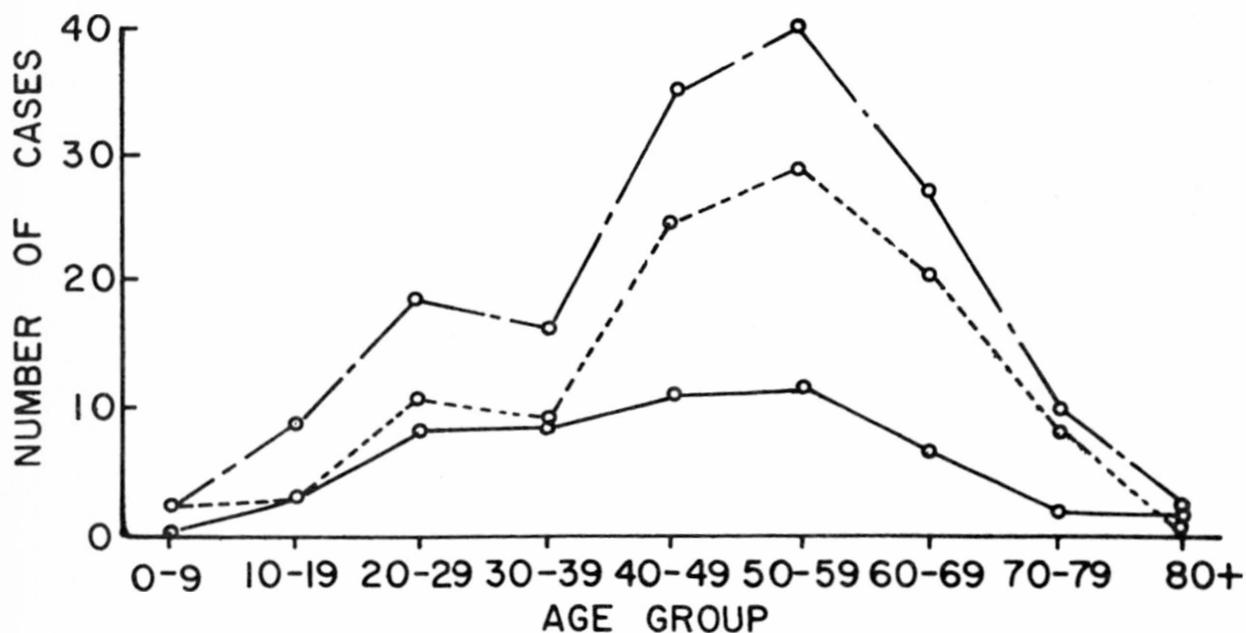
**VA — Veterans Administration

FIGURE 1A-1E
AGE AND SEX DISTRIBUTION OF
SELECTED MYCOTIC INFECTIONS
MAMS HOSPITALS 1968 AND 1969

I A. COCCIDIOIDOMYCOSIS

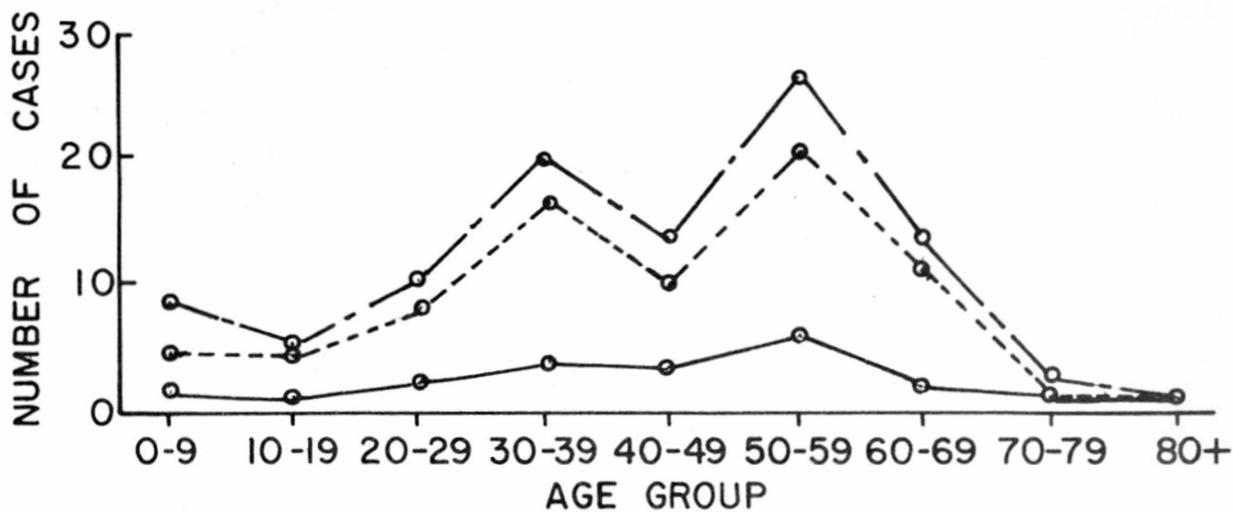


I B. CRYPTOCOCCOSIS

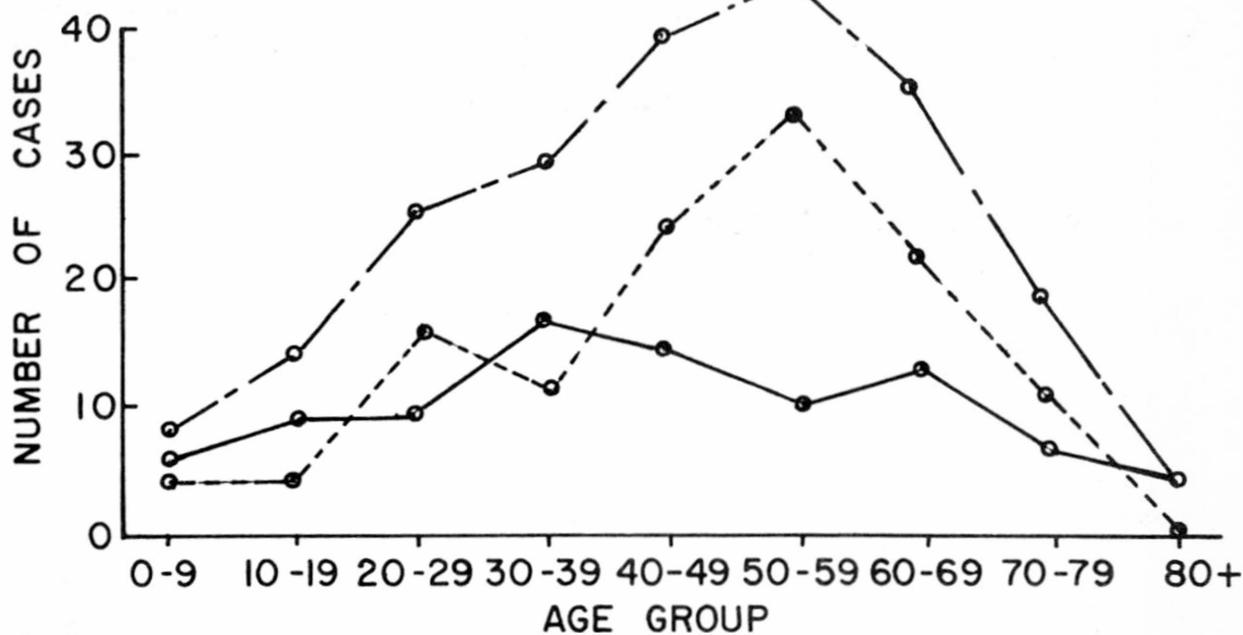


I C. BLASTOMYCOSIS

--- BOTH SEXES
 MALE
 — FEMALE



I D. ASPERGILLOSIS



I E. HISTOPLASMOSIS

--- BOTH SEXES
- - - MALE
— FEMALE

